PB-227 881

PLOT3D

Paul R. Dorn

Federal Water Pollution Control
Administration
Annapolis, Maryland

August 1969

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PB 227 881

Chesapeake Technical Support Laboratory
Middle Atlantic Region
Federal Water Pollution Control Administration
U.S. Department of the Interior

Technical Report No. 25

PLOT3D

by

Paul R. Dorn

August 1969

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Springfield VA 22151

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PLOT3D was written to aid the Chesapeake Technical Support Laboratory of the Middle Atlantic Region, Federal Water Pollution Control Administration in analyzing and displaying data. It has especially been used to display chemical concentrations at sampling stations at various times of the year. The report includes → P 1

This program uses a modified version of the subroutine PLOT3D written by Ronald W. Durachka of the Goddard Space Flight Center, Greenbelt, Maryland.

PLOT3D is operational on the IBM 360/Model 65 at the United States Geological Survey, Department of the Interior in Washington, D.C. The program was compiled using the IBM G-level compiler. The program should work with little or no change on any 360 computer having a G or H level compiler, and the North American Aviation's Stromberg-Carlson 4020 plotting package.

For further information regarding this and other current plotting routines, contact Dr. Norbert Jaworski, CTSL, Annapolis Science Center, Annapolis, Maryland, 21401, or phone 1-301-268-5038.

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PROGRAM: PLOT3D

ABSTRACT: PLOT3D is a STATPAC[1] format program which provides a means of plotting data in three dimensions at various degrees of rotation (0°-90°). It also allows data to be read directly from cards.

[1]STATPAC is an acronym for the U.S. Geological Survey Statistical Package. For further information, see the STATPAC manual which is available at the Department of the Interior, Computer Division, in Washington, D.C.

DESCRIPTION:

PLOT3D allows the user to view a plot three dimensionally at various angles of rotation, using the STROMBERG-CARLSON 4020 plotter. It only plots points in the first octant of three space (i.e. the three coordinates of the point must all be greater than or equal to zero).

The program plots the points on the graph, and connects them with straight lines. Any number of plots may be made on the same graph, but the same number of points is required for each plot.

The graph may be viewed at any degree of rotation about the Z-axis (0°-90°). The same graph may easily be drawn at more than one angle of rotation to allow the user to select the best viewing angle.

Options are available to label the axes, to title the graph, to read the data from cards rather than tape, to supply new variable identifiers, and the reorder the points in decreasing values of X and Y.

The axes' labels consist of 24 characters each. The title is 64 characters in length and is of larger print than the rest of the labeling. The labels are placed in the upper right-hand corner of the page; the title is centered at the bottom.

The variable names are not written on the graph but are only used in the accompanying 1403 line printout.

It is often desirable to reorder the points to make the graph more meaningful. Two methods are available:

(i) Assume there are N points per line on the graph. The points are first rearranged in decreasing value of Y. Then the first group of N points is rearranged in decreasing value of X. Next the second group of N points is rearranged in decreasing X. This continues until all the points are reordered.

(ii) The second method is identical to the first except the points are first reordered in X and then in Y.

The output from this program is written on a 7-track, non-labeled magnetic tape which is then run on the STROMBERG-CARLSON 4020 plotter to form the actual graph.

This program handles indeterminants in the Z coordinate but not in the X or Y coordinate. If the code is N, L, or T, a value of +0.0 is assumed. If the indeterminant is a G or H, a value of +1.0E+49 is assumed. This point is not actually plotted and does not affect the graph's scales. Instead the line connecting the points is broken, signifying the point is off scale. If the indeterminant code is B (implying no data given), the program assigns it the weighted average of the pre-

ceding and succeeding points. If it is the first (or last) point in the line, it is given the Z coordinate of the second (or last) point in the line. Note that the program does not consider the values of points in other lines of the same graph. This action occurs after the points have been reordered (if this option is chosen).

Although the plot must be entirely in the first octant, this program is capable of handling values in other parts of 3-space. The program will translate the coordinate axes if necessary to make all the points lie in the first octant. Diagnostic messages are provided to indicate this has occurred.

Because the axes' scales are printed using a decimal format, it may be necessary to rescale the input data. Provisions are made to multiply the coordinates by a power of ten. The accompanying line printout lists these scaling factors.

Rather than using scaling factors, it is also possible to delete the printing of the scales. The user can then insert them by hand.

RESTRICTIONS:

A maximum of 99999 rows (observations) and 199 columns (variables) are permitted on the input tape or data cards, with a maximum of 199 pairs of selected rows with a total of 200 individual rows. Indeterminants are allowed in the Z but not in the X and Y variables.

PROGRAM RUN PREPARATION:

The following is a complete deck setup for this program:

1. JOB card
2. System control cards (including the object or source deck)
3. Header card
4. Basic parameter card
5. Selected observation card(s)*
6. Variable ID card*
7. Title card*
8. Axes label cards*
9. Range card*
10. Object time format card*
11. Data cards*
12. Delimiter card

*Optional--see the individual sections on the various cards.

If more than one run is to be made, repeat cards 3-11 as necessary. Card number 12 (delimiter) should be placed last in the deck.

JOB CARD:

The JOB card cannot be catalogued and is installation as well as machine dependent. Below is the specification for the 360/Model 65 located in the Department of the Interior building, in Washington, D.C. The structure of the JOB card changes occasionally, and one should check with the computer center before using the below form.

Card 1 -

Card Columns	Contents
1 - 2	//
3	Center Code: D = Denver, Colorado F = Flagstaff, Arizona I = Crystal Plaza, Virginia M = Menlo Park, California R = Rolla, Missouri W = Washington, D.C.
4 - 5	Agency Code.
6 - 8	User registration code.
9 - 10	User's ID. May be changed by the user as desired. Do not use the same two characters for different jobs run during the same day.
11	Blank.
12 - 14	JOB (i.e. the word JOB).

Card Columns	Contents
15	Blank.
16	((Left parenthesis).
17 - 20	Program Number.
21	, (Comma).
22 - 25	Auxiliary account number.
26	, (Comma).
27 - 30	Estimated execution time in minutes. Requires four numeric digits.
31	, (Comma).
32 - 35	Estimated lines of print expressed in thousands of lines. Requires four numeric digits.
36	, (Comma).
37 - 40	Estimated number of cards to be punched. Requires four numeric digits.
41	, (Comma).
42	Reserved for future use; must be a 1 punch.
43	, (Comma).
44	Reserved for future use; must be a 1 punch.
45	, (Comma).
46	Type of Run: C = Compile only T = Test of program P = Production use of program

Card Columns	Contents
47	, (Comma).
48 - 49	Number of lines per page. A value of zero suppresses page overflow tests. If this field (and the preceding comma) is eliminated, a default option of 61 lines per page is used. In this case, the following fields are shifted left 3 columns. (Except columns 62-72.)
50	) (Right parenthesis).
51	, (Comma).
52	' (Apostrophe).
53 - 61	Name of the user.
62	' (Apostrophe).
63	, (Comma).
64 - 71	Blank.
72	X (The letter X).

Card 2 -

Card Columns	Contents
1 - 2	//
3 - 15	Blank.
16 - 25	MSGLEVEL=1
26	, (Comma).
27 - 33	CLASS=C
34 - 72	Blank.

SYSTEM CONTROL CARDS:

Cards 1 & 2:

(a) If the object deck is used -

```
1
//bEXECbLINKFORT,REGION.GO=252K,TIME.GO=J
//LKED.SYSINbDDb*
```

where J is the time required to run the program (in minutes). The 'b' stands for a blank space. Next comes the object deck (including its delimiter).

(b) If the source deck is used -

```
1
//bEXECbFORTGCLG,PARM.FORT='DECK',REGION.GO=252K,TIME.GO=J
//FORT.SYSINbDDb*
```

where J is as before. Next comes the source deck (including its delimiter).

Cards 3 & 4:

(a) If the data resides on the disc SYSDK -

```
1
//GO.FT10F001bDDbDSN=&NAME,UNIT=SYSDK,DISP=(OLD,PASS/DELETE,DELETE),
//bDCB=(RECFM=VB,LRECL=RRR,BLKSIZE=BBBB)
```

where &NAME is the name of the storage space. (The '&' signifies the storage is temporary--it only exists for the extent of the job.) PASS is used if the data file is used later on; otherwise use DELETE.

The letters 'RRR' and 'BBBB' are computed as follows:

RRR = 8M + 24 where M = number of columns in the data matrix.

BBBB = K(RRR) + 4 where K is an integer chosen so that the positive difference (7200-BBBB) is as small as possible.

(b) If the data resides on magnetic tape -

```
1
//GO.FT10F001bDDbUNIT=2400,LABEL=(,SL),VOLUME=(,RETAIN,,,SER=YYYYYY)
//bDCB=(RECFM=VB,LRECL=RRR,BLKSIZE=BBBB),
//bDISP=(OLD,KEEP),DSN=STAPAC
```

where 'YYYYYY' in the first tape card represents a six digit input tape number (leading zeros must be given).

The letters 'RRR' and 'BBBB' are as before.

When a tape is used, a tape setup card is required. Its form is:

Card Columns	Contents
1 - 9	/*MESSAGE
10 - 12	Blank.
13 - 20	The same characters as in columns 3-10 of the JOB card.
21 - 22	Blank.
23 - 27	SETUP
28 - 29	Blank.
30 - 36	The number of the tape used.
37 - 38	/9

If the tape is written on as well as read, in column 39 place an R (for ring in). This card should be place right after the JOB card. (This card's format is particular to the 360/65 in Washington, D.C.)

(c) If the data is on cards -

```
1
//GO.FT10F001bDDbDUMMY
```

Cards 5 & 6:

```
1
//GO.FT11F001bDDbUNIT=2400-2,VOL=SER=ZZZZZZ,LABEL=(,NL),
//bDCB=(DEN=1,TRTCH=C,RECFM=U,BLKSIZE=400)
```

The letters 'ZZZZZZ' in the first tape card represent a six digit output tape number. (Leading zeros must be given.) This tape also requires a tape setup card. Its form is identical to the above setup card except in columns 37-40 place the four characters /7NR. In the event both input and output tapes are used, only one message card is required. Place a comma in column 40, the plot tape in columns 41-46, and'/7NR' in columns 47-50.

Card 7:

```
1
//GO.SYSINbDDb*
```

HEADER CARD:

Columns	Format	Entry	Description
1-30	7A4,A2	TITLE	Up to 30 characters of alpha-numeric information used to title the output for this data set. It is also used when listing the total number of plots created. It is not used on the graph.
31-38	2A4	INPUT ID	Up to 8 characters of alpha-numeric information used to identify the input data set.
39-43	I5	INPUT N	The number of rows in the input data matrix. (Right justified.)
44-46	I3	INPUT M	The number of columns in the input data matrix, (Right justified, ≤ 199.)
47-56	10I1	OPTION	See the following sheet.
73-77	I5	PRON	The number of pairs of row numbers needed to select the desired rows of the input matrix. If blank, all rows are included. If not blank, this number must be right justified and row selector cards must be included.

OPTIONS -

OPTION(1) - 0 - No action taken.
1 - A title is read for the graph(s).

OPTION(2) - 0 - No action taken.
1 - Labels for the three axes are read.

OPTION(3) - 0 - No action taken.
-1 - Data resequenced on Y, then X.
2 - Data resequenced on X, then Y.

OPTION(4) - 0 - Data read from STATPAC tape.
1 - Data read using STATPAC 10 values/card, G-format.
2 - Data read using STATPAC 7 values/card, G-format.
3 - Data read using object time format.

OPTION(5) - 0 - Program calculates scales.
1 - User supplies scales.

OPTION(6) - 0 - No action taken.
1 - Data is listed.

OPTION(7) - 0 - Axis scales are printed.
1 - Axis scales are not printed.

OPTION(8) - 0 - Cameras left unchanged (originally 9-inch on).
1 - 35mm camera on; 9-inch camera off.
2 - Both cameras on.
3 - 9-inch camera on; 35mm camera off.

OPTION(9) -Not used.

OPTION(10) - 0 - No action taken.
1 - New variable ID's are read.

BASIC PARAMETER CARD:

This card is used to give the individual characteristics of the plot.

Columns	Format	Entry	Description
1-3	I3	IX	Number of the X variable. Must be right justified.
4-6	I3	IXMULT	The power of 10 to multiply times the X variable. Must be right justified.
7-9	I3	IY	Number of the Y variable. Must be right justified.
10-12	I3	IYMULT	The power of 10 to multiply times the Y variable. Must be right justified.
13-15	I3	IZ	Number of the Z variable. Must be right justified.
16-18	I3	IZMULT	The power of 10 to multiply times the Z variable. Must be right justified.
19-21	I3	IPER	The number of points per plot. The total number of selected observations must be evenly divisible by IPER.
22-24	I3	NPLOT	The number of graphs to be made for this run; i.e. the number of different angles at which the data is to be displayed.

Columns	Format	Entry	Description
25-29	F5.0	THETAS	The viewing angle for the first plot. (In degrees).
30-34	F5.0	DELTA	The increment to be added to THETAS between graphs. (In degrees).

SELECTED OBSERVATION CARD:

These cards are used if PRON on the HEADER card is non-zero. The number of pairs of row selectors used to pick the desired rows of the data matrix is entered in the field PRON, right justified. Each pair specifies that the rows FROM and including the first member of the pair TO and including the last member of the pair to be selected. The pairs must be entered starting in the left most field of the card (columns 1-5) and continuing across eight pairs per card. If more pairs are used, continue on another card. If a particular pair consists of only one observation, the FROM portion should be completed and the TO portion left blank. The FROM members are entered in columns 1-5, 11-15, 21-25, etc., while the TO portions are entered in columns 6-10, 16-20, 26-30, etc.

The row numbers must form an increasing sequence (except the blank TO fields signifying a single observation); i.e., rows must be selected in the order they appear in the data matrix. These numbers must also be right justified.

VARIABLE ID CARD:

This card is used if OPTION(10) is not blank or zero. In columns 1-8, place the new name of the X variable. In columns 9-16, place the new name of the Y variable and in columns 17-24, place the name of the Z variable. Note that these names do not appear on the graph but only on the accompanying line printout. The names do not replace the original names on the STATPAC tape.

TITLE CARD:

This card is used if OPTION(1) is not blank or zero. This title is placed at the bottom of the graph(s) produced by this run. It should be placed in columns 1-58 of the card. For aesthetic reasons, the title should be centered, although it is not required. The allowed characters are shown in Appendix III. Since the title is printed in A format, BCD characters may print differently.

AXIS LABEL CARDS:

This card is used if OPTION(2) is not blank or zero. In columns 1-28, place the label of the axis. The first card should be the X axis' label, the second card for the Y axis, and the third should be the label for the Z axis.

The labels are printed in the upper right-hand corner of the graph(s). They are printed in the form:

X = LABEL

RANGE CARD:

This card is used if OPTION(5) is non-zero or blank. It gives the coordinates of the maximum and minimum values of the plot for the X, Y, and Z axes. If this option is not used, the maximum and minimum values of the variables being plotted gives the graph's range. The format of the range card is:

Columns	Value
1-10	XMIN
11-20	XMAX
21-30	YMIN
31-40	YMAX
41-50	ZMIN
51-60	ZMAX

The data may be entered in decimal or scientific notation. These values must be at least as large as the actual coordinates of the plotted values or the normal method is used to select the ranges (i.e., the minimum and maximum values of the points gives the ranges).

For aesthetic reasons, it is best to supply the range values rather than letting the program calculate them. To make the axes' scales whole numbers, the ranges should be divisible by 5.

OBJECT TIME FORMAT CARD:

This card is used if OPTION(4) is equal to 3. That is, if the data is read from cards in a non-STATPAC format. If this method is used, indeterminants are not allowed; they are not even to be read. Nor are any observation identifications to be used.

The format of this card is identical to the standard FORTRAN FORMAT statement except it begins with the left parenthesis rather than the word FORMAT. It must end with a right parenthesis. It is only to be used to read in the data values, not indeterminant codes.

Example -

Standard FORMAT statement: FORMAT(3X,F10.1,12X,F5.0/F3.0)

Object time FORMAT statement: (3X,F10.1,12X,F5.0/F3.0)

DATA CARDS:

The data cards are used only if OPTION(4) is not zero. The type of data card depends upon the value of OPTION(4):

(1) STATPAC cards - 10 values/card

(2) STATPAC cards - 7 values/card

(3) Non-standard cards; given by Object Time Format

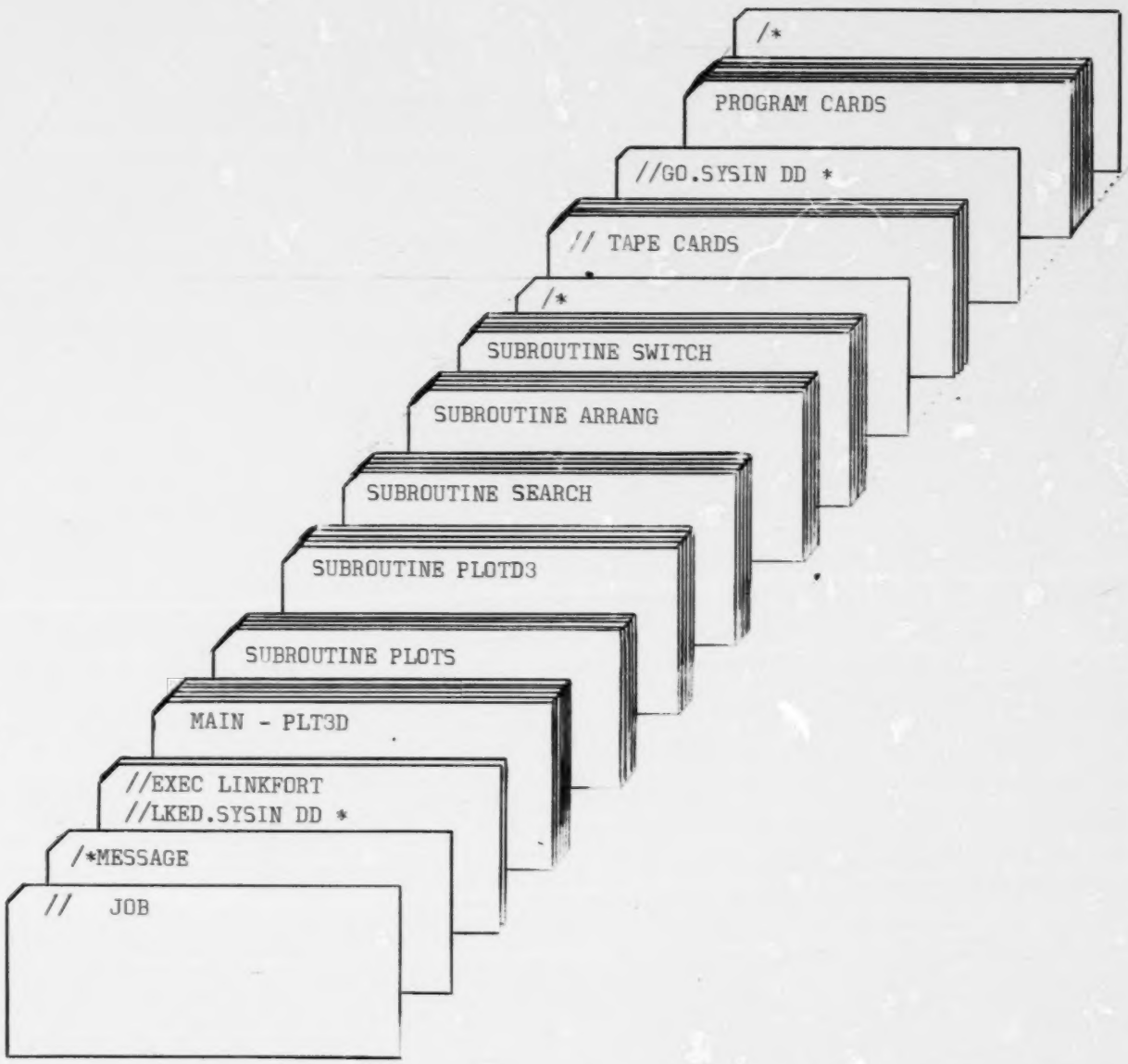
If non-standard cards are read, indeterminants are not used. For STATPAC cards the row sequence number (columns 79-80) is not checked. For further information on the STATPAC format cards, see Appendix I.

DELIMITER CARD:

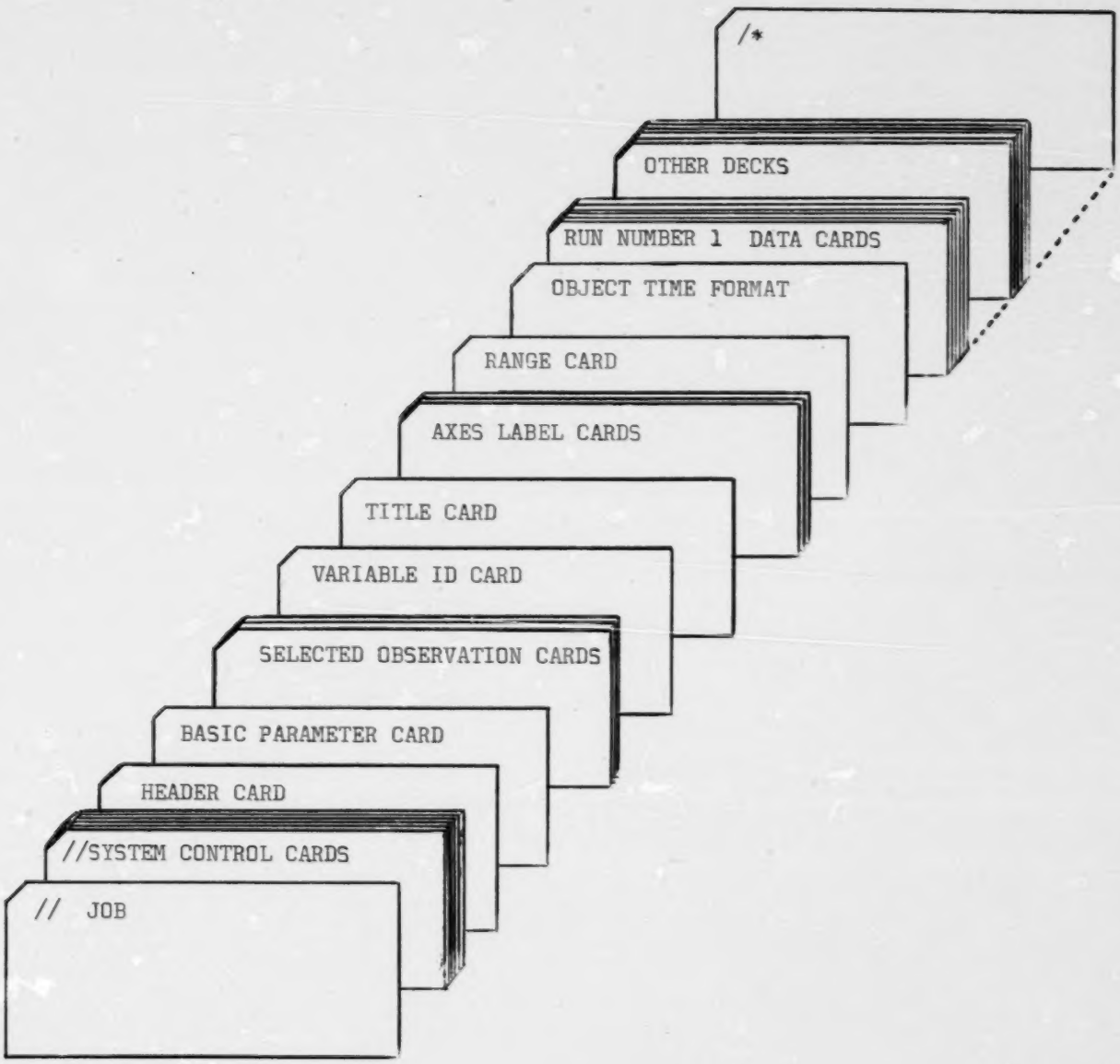
This card must physically be the last card of the deck.

It has the form:

```
1
/*
```


/*
PROGRAM CARDS
//GO.SYSIN DD *
// TAPE CARDS
/*
SUBROUTINE SWITCH
SUBROUTINE ARRANG
SUBROUTINE SEARCH
SUBROUTINE PLOTD3
SUBROUTINE PLOTS
MAIN - PLT3D
//EXEC LINKFORT
//LKED.SYSIN DD *
/*MESSAGE
// JOB

DECK SETUP



PROGRAM SETUP

IBM GENERAL PURPOSE CARD PUNCHING FORM

JOB	
BY	DATE

PUNCHING INSTRUCTIONS

WRITTEN AS:												
PUNCH AS:												

NOTES:

FIELD IDENTIFICATION

1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80
1 2 3 4 5 6 7 8 9 0	1 2 3 4 5 6 7 8 9 0	1 2 3 4 5 6 7 8 9 0	1 2 3 4 5 6 7 8 9 0	1 2 3 4 5 6 7 8 9 0	1 2 3 4 5 6 7 8 9 0	1 2 3 4 5 6 7 8 9 0	1 2 3 4 5 6 7 8 9 0

HEADER CARD:

ALPHANUMERIC TITLE	INPUT			OPTIONS		PRON
	ID	N	M			

BASIC PARAMTER CARD:

IX	IXM	IY	IYM	IZ	IZM	JPER	NPT	THETAS	DELTA

OBSERVATION SELECTOR CARD:

FROM	TO	FROM	TO	FROM	TO	FROM	TO	FROM	TO	FROM	TO	FROM	TO	FROM	TO

VARIABLE ID CARD:

XNAME	YNAME	ZNAME

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IBI GENERAL PURPOSE CARD PUNCHING FORM

JOB	
BY	DATE

PUNCHING INSTRUCTIONS

WRITTEN AS:												
PUNCH AS:												

NOTES:

FIELD IDENTIFICATION

1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80
1234567890	1234567890	1234567890	1234567890	1234567890	1234567890	1234567890	1234567890

1 TITLE CARD:

2	ALPHANUMERIC TITLE
3	

4

5 AXIS LABEL CARD:

6	
7	ALPHANUMERIC LABEL FOR AXIS
8	

9

10

11 RANGE CARD:

12	XMIN	XMAX	YMIN	YMAX	ZMIN	ZMAX
13						

14

15

16

17

18

19

20

Appendix I: STATPAC Data Cards

These cards contain the elements in the data matrix. Each element (or data value) in the matrix is made up of a number and an associated code. The code can be omitted in which case the data value is a number (e.g., 3.75) or a code can be used with a data value to qualify that value (e.g., ≤3.75).

The following types of codes are provided in the STATPAC system:

Code	Description
N	Not detected, looked for not found, or less than some indefinite lower limit of analytical sensitivity.
H	Present in concentrations greater than some indefinite limit of sensitivity.
L	Concentration is less than some stated lower limit of analytical sensitivity.
G	Concentration is greater than some stated upper limit of sensitivity.
B	No data - blank.
T	Trace, concentration is near the lower limit of sensitivity.

The meaning of these codes is only relative; therefore they can be used to indicate any situation the user has where the definition applies. Programs in the STATPAC system treat qualified

values in various ways and therefore the user is cautioned to read the documentation of the particular programs he is interested in using. For this program, see the section DESCRIPTION.

Each data card contains the following fields:

Columns	Format	Entry
1-70	(See below)	data field
71-78	2A4	row identifier
79-80	I2	sequence number

(i) Data field -

The format selected must be the same for all data cards pertaining to a given data matrix (see OPTION(4)). The elements of the data matrix are entered onto the data cards, starting with the value of row one, column one, placed in the first position of the first data card. The remaining values in this same row are placed across the balance of the card, with a maximum of either 7 or 10 values per card. The maximum number of values per card depends upon the format selected. If the rows of the data matrix contain more than the maximum allowed per card, then the remaining values are placed on subsequent cards, starting in position 1 of the next data card, and placing

the maximum allowed per card. A new row of the data matrix always begins on a new card (position 1).

Types of Data Field Formats

1. 10 values per card, G-Format

This format allows a maximum of 10 values per card. Each value occupies 7 card columns and is expressed in either decimal, scientific, or integer notation. The first value is placed in columns 1-7, the second in columns 8-14, etc., the last (or 10th value) in columns 64-70.

The following is a description of the value field:

Position	Description
1	The code used with this value.
2-7	The data value in either decimal, scientific, or integer notation.

If decimal notation is used, a decimal point must appear in the number and the number may be placed anywhere in the field. If scientific notation is used, then the number must be expressed in exponential form and right aligned in the field. If integer, then the number must not contain a decimal point and must be right justified in the field. If any of the positions are left blank, then a zero is assumed for those positions. Different notations may be used on the same card.

2. 7 values per card, G-format

This format is similar to the '10 values per card, G-format' except that 7 values are punched per card with each value occupying 10 columns. The first value is placed in columns 1-9, with its code in column 10, the second in columns 11-19, with its code in column 20, etc.; the last (or 7th value) is placed in columns 61-69 with its indeterminant code in column 70.

Position	Description
1-9	The data value in either decimal, scientific, or integer notation.
10	The code used with this value.

(ii) Row Identifier field -

In columns 71-78 of the data cards, eight alphanumeric characters can be inserted to identify each row of the data matrix. This identifier must be repeated for each of the data cards pertaining to a particular row.

(iii) Sequence Count field -

In columns 79-80 of each data card, a sequence number can be inserted. This number is the sequence of data cards pertaining to one row of a data matrix. The units position of the number must be placed in column 80.

The sequence number for the first card of each row of a data matrix must be a 1. The sequence numbers for subsequent

data cards pertaining to this must form a consecutive increasing sequence.

Although this program does not check the sequence count, it is necessary if the data cards are used with the STATPAC card entry program.

IBM GENERAL PURPOSE CARD PUNCHING FORM

JOB	
BY	DATE

PUNCHING INSTRUCTIONS

WRITTEN AS:												
PUNCH AS:												

NOTES:

FIELD IDENTIFICATION

1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80
1 2 3 4 5 6 7 8 9 0	1 2 3 4 5 6 7 8 9 0	1 2 3 4 5 6 7 8 9 0	1 2 3 4 5 6 7 8 9 0	1 2 3 4 5 6 7 8 9 0	1 2 3 4 5 6 7 8 9 0	1 2 3 4 5 6 7 8 9 0	1 2 3 4 5 6 7 8 9 0

STATPAC DATA CARDS:

10-VALUES PER CARD/G-FORMAT

1 VALUE	CODE	2 VALUE	CODE	3 VALUE	CODE	4 VALUE	CODE	5 VALUE	CODE	6 VALUE	CODE	7 VALUE	CODE	8 VALUE	CODE	9 VALUE	CODE	10 VALUE	ALPHABETIC ID	SEQ

7-VALUES PER CARD/G-FORMAT

1 VALUE	CODE	2 VALUE	CODE	3 VALUE	CODE	4 VALUE	CODE	5 VALUE	CODE	6 VALUE	CODE	7 VALUE	CODE	ALPHABETIC ID	SEQ

Printed in U.S.A. X20-8030-03 UM/025

Appendix II: Sample Output

THREE DIMENSIONAL PLOT

NOW PROCESSING JOB NUMBER 2

DATE OF RUN IS 9/ 4/69

THREE DIMENSIONAL PLOT 9/ 4/69

TITLE	INPUT ID	N	M	***** OPTIONS *****
MINE DRAINAGE DATA	DRAINAGE	448	12	1 1 1 2 1 1 0 2 2 0

X VARIABLE - TEMP (2)
Y VARIABLE - FLOW (9)
Z VARIABLE - AC TH(Q)(7)

SELECTED OBSERVATIONS
1- 20

DATA FORMAT - LOCATED ON STATPAC FORMAT TAPE

THREE DIMENSIONAL PLOT

9/ 4/69

TITLE	INPUT ID	N	M	***** OPTIONS *****
MINE DRAINAGE DATA	DRAINAGE	448	10	1 1 1 0 1 1 0 2 0 0

OBSERVATION	ID	TEMP	FLOW	AC TH(Q)
1	CFS 2	2.200E 01	1.700E 00	2.762E 04
2	CFS 2	7.000E 00	1.900E 00	1.186E 04
3	CFS 2	1.000E 01	3.300E 00	2.805E 04
4	CFS 2	4.000E 00	1.100E 00	2.344E 04
5	CFS 2	4.000E 00	5.800E 00	6.241E 04
6	CFS 2	1.200E 01	3.100E 00	3.252E 04
7	CFS 2	1.200E 01	2.100E 00	2.455E 04
8	CFS 2	1.400E 01	1.300E 00	1.054E 04
9	CFS 2	2.200E 01	2.200E 00	1.704E 04
10	CFS 2	1.200E 01	4.300E 00	9.856E 04
11	CFS 2	2.000E 01	1.500E 00	4.581E 04
12	CFS 2	2.700E 01	3.000E-01	9.103E 03
13	CFS 2	2.300E 01	6.000E-01	1.908E 04
14	CFS 2	1.900E 01	2.000E-01	6.571E 03
15	CFS 2	1.600E 01	1.000E-01	4.732E 03
16	CFS 2	2.000E 00	2.820E 00	1.329E 05
17	CFS 2	4.000E 00	2.500E 00	3.443E 04
18	CFS 2	4.500E 00	3.200E 00	4.545E 04
19	CFS 2	1.000E 00	1.400E 00	2.082E 04
20	CFS 2	8.000E 00	4.900E 00	3.625E 04

THREE DIMENSIONAL PLOT 9/ 4/69

TITLE	INPUT ID	N	M	***** OPTIONS *****
MINE DRAINAGE DATA	DRAINAGE	448	10	1 1 1 2 1 1 0 2 2 0

X SCALE FACTOR = 1.000E 00
Y SCALE FACTOR = 1.000E 00
Z SCALE FACTOR = 1.000E-03

AXIS	MINIMUM	MAXIMUM	DIVISION
X	0.0	3.000E 01	3.000E 00
Y	0.0	5.800E 00	5.800E-01
Z	0.0	1.500E 02	1.500E 01

THREE DIMENSIONAL PLOT

9/ 4/69

TITLE	INPUT ID	N	M	***** OPTIONS *****
MINE DRAINAGE DATA	DRAINAGE	448	10	1 1 1 0 1 1 0 2 0 0

PLOT	THETA	TIME
1	30.00	0.0
2	40.00	0.0

THREE DIMENSIONAL PLOT

FINISHED PROCESSING JOB NUMBER 2

HAVE MADE 2 PLOTS.
ELAPSED TIME =

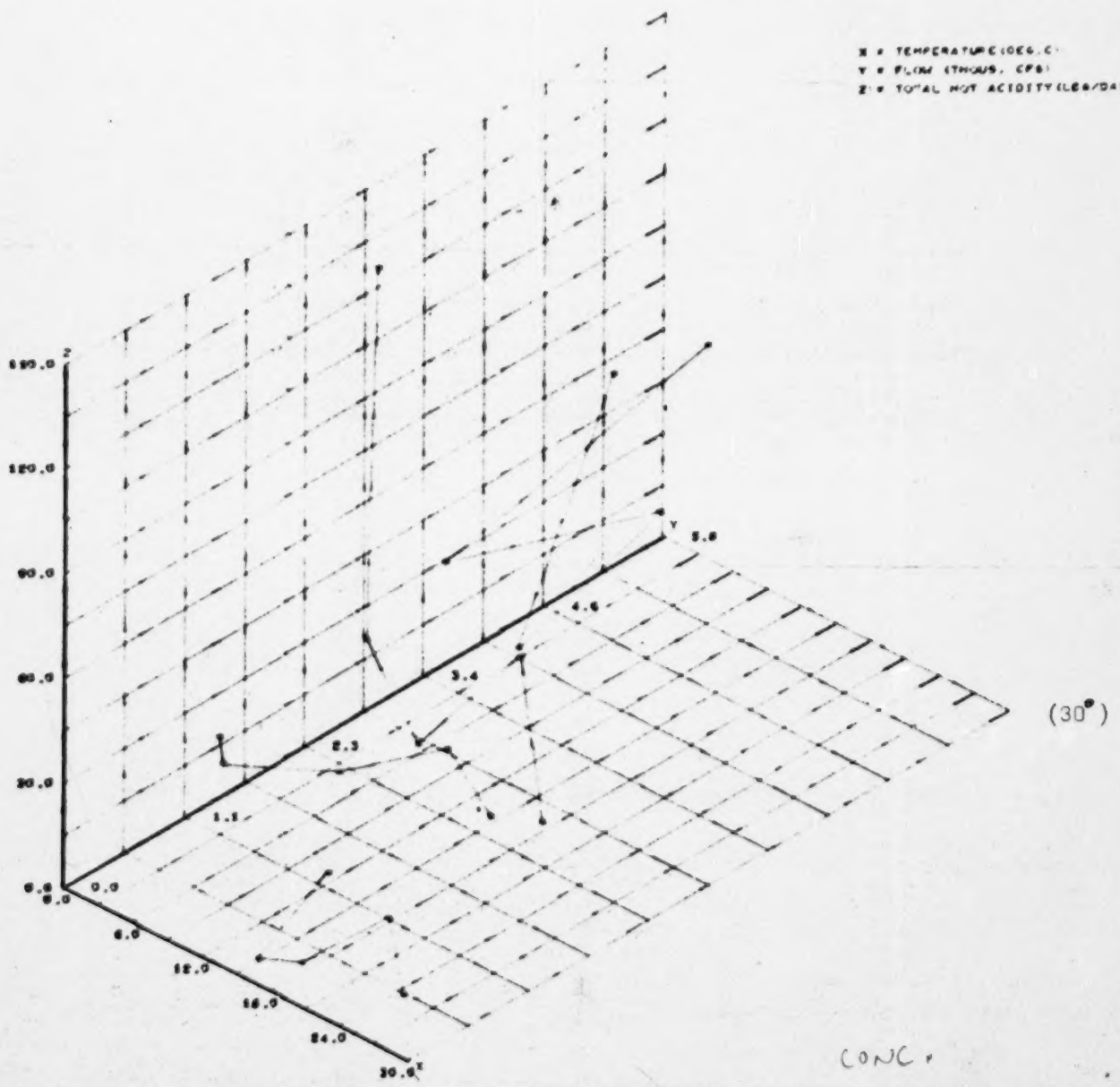
TIMED(1)-----RUN TIME = 49.87 SECONDS-----

THREE DIMENSIONAL PLOT

PROCESSED 2 JOBS.

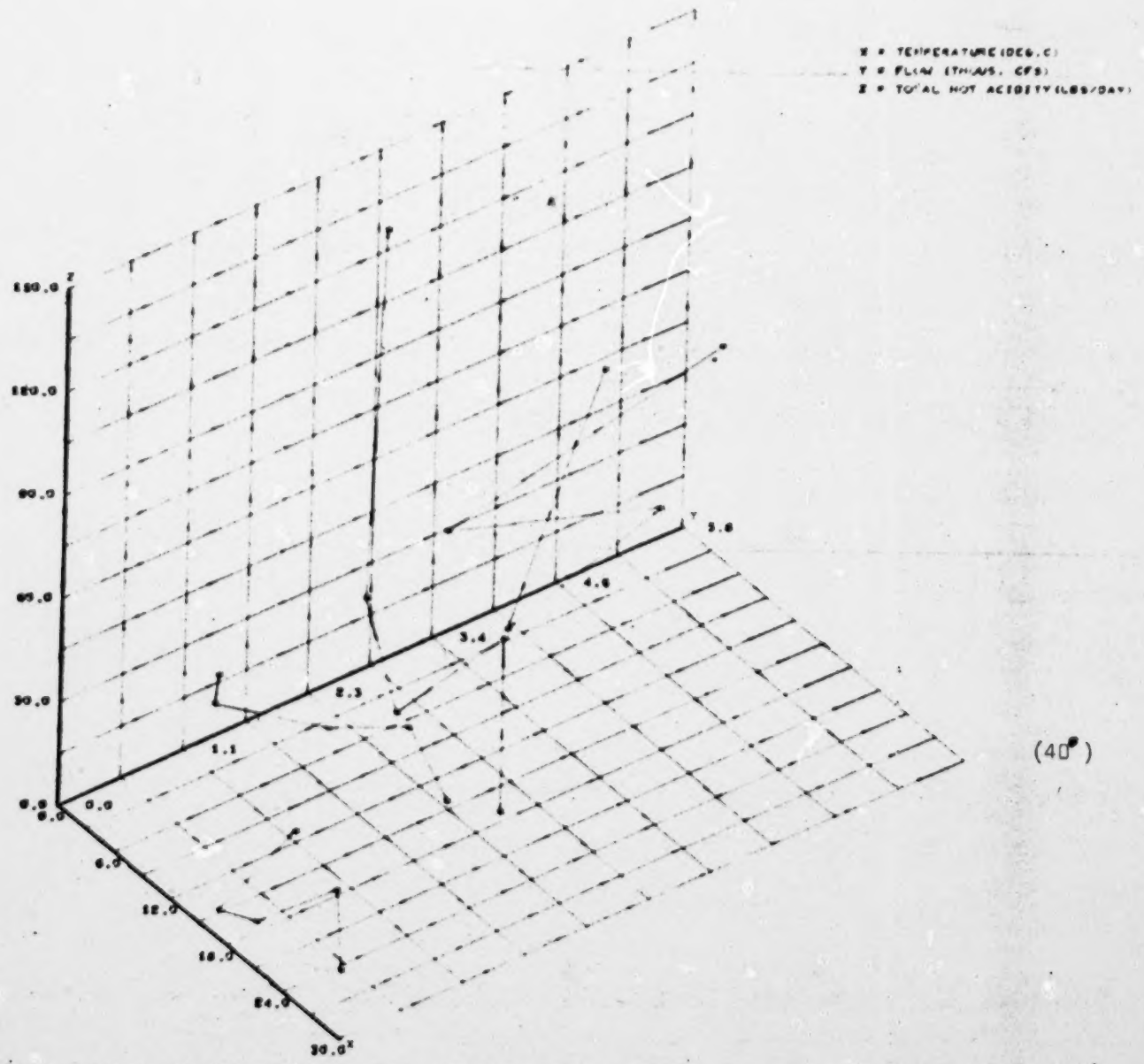
MADE 2 PLOTS

DATE OF RUN - 9/ 4/69



CONC.

ACIDITY (LBS/DAY) AS A FUNCTION OF TEMPERATURE AND FLOW



(40°)

ACIDITY (LBS/DAY) AS A FUNCTION OF TEMPERATURE AND FLOW

Appendix III: EBCDIC Characters

Alphabetic Characters	Card Punches
A	12-1
B	12-2
C	12-3
D	12-4
E	12-5
F	12-6
G	12-7
H	12-8
I	12-9
J	11-1
K	11-2
L	11-3
M	11-4
N	11-5
O	11-6
P	11-7
Q	11-8
R	11-9
S	0-2
T	0-3
U	0-4
V	0-5
W	0-6
X	0-7
Y	0-8
Z	0-9

Numeric Characters	Card Punches
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9

Special Characters	Card Punches
-	11
/	0-1
.	12-8-3
(	12-8-5
+	12-8-6
$	11-8-3
*	11-8-4
)	11-8-5
,	0-8-3
=	8-6
"	8-7

Appendix IV: Program Listing

****** PLOT3D ******

```
C                                                                       P3D     0
C       THIS PROGRAM WAS WRITTEN BY PAUL R. DORN,                       P3D    10
C       CHESAPEAKE TECHNICAL SUPPORT LABORATORY                         P3D    20
C       ANNAPOLIS, MARYLAND                                             P3D    30
C       IT USES THE SUBROUTINE PLOTD3 WRITTEN BY RONALD W. DURACHKA     P3D    40
C       OF GODDARD SPACE FLIGHT CENTER                                  P3D    50
C       FOR FURTHER INFORMATION ON THIS PROGRAM, SEE THE CTSL           P3D    60
C       TECHNICAL REPORT NUMBER 25.                                     P3D    70
C                                                                       P3D    80
C                                                                       P3D    90
C       THIS IS THE MAIN ROUTINE FOR PLOT3D.                            P3D   100
C       IT SETS UP THE TAPE UNITS AND REWINDS THE PLOT TAPE.            P3D   110
C       TO CHANGE TAPE UNITS IT IS ONLY NECESSARY TO CHANGE THE         P3D   120
C       FOUR CARDS LISTED UNDER THE HEADING "TAPE UNITS".               P3D   130
C       THE DESIGNATIONS ARE:                                           P3D   140
C           SYSIN  - CARD READER                                        P3D   150
C           SYSOUT - LINE PRINTER                                       P3D   160
C           STAT   - BINARY INPUT TAPE                                  P3D   170
C           PLTTPE - OUTPUT PLOTTING TAPE (FOR USE ON THE S-C 4020).    P3D   180
C       THE MAIN ROUTINE THEN CALLS THE SUBROUTINE PLOTS WHICH          P3D   190
C       READS IN THE DATA, MODIFIES IT, AND CALLS THE SUBROUTINE PLOTD3 P3D   200
C       WHICH DOES THE ACTUAL PLOTTING.                                 P3D   210
C                                                                       P3D   220
      IMPLICIT INTEGER (A-Z,$)                                          P3D   230
      COMMON XX(400),SYSIN,SYSOUT,PLTTPE,STAT                           P3D   240
   10 CONTINUE                                                          P3D   250
C                                                                       P3D   260
C     TAPE UNITS                                                        P3D   270
C                                                                       P3D   280
      SYSIN=5                                                           P3D   290
      SYSOUT=6                                                          P3D   300
      STAT=10                                                           P3D   310
      PLTTPE=11                                                         P3D   320
      CAMERA = 0                                                        P3D   330
      REWIND PLTTPE                                                     P3D   340
      CALL TPNUMV(PLTTPE)                                               P3D   350
      CALL CAMRAV(CAMERA)                                               P3D   360
C                                                                       P3D   370
      CALL PLOTS                                                        P3D   380
      STOP                                                              P3D   390
```

```
C                                                                       P3D   400
C       TO TRACE THROUGH THIS PROGRAM, REMOVE THE C FROM                P3D   410
C       THE FOLLOWING STATEMENTS:                                       P3D   420
C       DEBUG UNIT(6),TRACE                                             P3D   430
C       AT 10                                                           P3D   440
C       PRINT 1000                                                      P3D   450
C1000   FORMAT('1TRACING FOR PROGRAM PLOT3D.  CALL SUBROUTINE PLOTS')   P3D   460
C       TRACE ON                                                        P3D   470
C                                                                       P3D   480
C                                                                       P3D   490
        END                                                             P3D   500
C                                                                       P3D   510
C       PLOT3D                                                          P3D   520
C       ------                                                          P3D   530
C                                                                       P3D   540
C       THIS SUBROUTINE IS USED TO READ IN THE DATA, REARRANGE IT AND   P3D   550
C       THEN CALL THE SUBROUTINE PLOT03 TO DO THE ACTUAL PLOTTING.      P3D   560
C                                                                       P3D   570
C       OPTIONS ARE AVAILABLE TO:                                       P3D   580
C           OPTION ( 1) - IF ZERO,NO ACTION TAKEN                       P3D   590
C                         IF ONE, A TITLE IS READ FOR THE PLOT(S)       P3D   600
C           OPTION ( 2) - IF ZERO,NO ACTION TAKEN                       P3D   610
C                         IF ONE, IDENTIFICATIONS FOR X,Y,AND Z READ IN P3D   620
C           OPTION ( 3) - IF ZERO,NO ACTION TAKEN                       P3D   630
C                         IF ONE, DATA RESEQUENCED ON Y,THEN X          P3D   640
C                         IF TWO, DATA RESEQUENCED ON X,THEN Y          P3D   650
C           OPTION ( 4) - IF ZERO,DATA READ FROM STATPAC TAPE           P3D   660
C                         IF ONE, DATA READ USING 10 VALUES/CARD FORMAT P3D   670
C                         IF TWO, DATA READ USING  7 VALUES/CARD FORMAT P3D   680
C                         IF THREE,DATA READ USING OBJECT TIME FORMAT,  P3D   690
C                             NO INDETERMINANTS                         P3D   700
C           OPTION ( 5) - IF ZERO,PROGRAM CALCULATES SCALES             P3D   710
C                         IF ONE,USER SUPPLIES SCALES                   P3D   720
C           OPTION ( 6) - IF ZERO,NO ACTION TAKEN                       P3D   730
C                         IF ONE, DATA IS LISTED                        P3D   740
C           OPTION ( 7) - IF ZERO, AXES SCALES ARE PRINTED.             P3D   750
C                         IF ONE, AXES SCALES ARE NOT PRINTED.          P3D   760
C           OPTION ( 8) - IF ZERO, CAMERAS ARE NOT CHANGED.             P3D   770
C                         IF ONE, 35MM CAMERA IS USED.                  P3D   780
C                         IF TWO, BOTH BOTH THE 9-INCH AND THE 35MM     P3D   790
C                             CAMERAS ARE USED.                         P3D   800
C                         IF THREE, 9-INCH CAMERA IS USED.              P3D   810
C           OPTION ( 9) - NOT USED.                                     P3D   820
C           OPTION (10) - IF ZERO,NO ACTION TAKEN                       P3D   830
C                         IF ONE, NEW VARIABLE ID'S ARE SUPPLIED.       P3D   840
C***********************************************************************P3D   850
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```
C
      SUBROUTINE PLOTS                                                  P3D   860
                                                                        P3D   870
      INTEGER SYSIN,SYSOUT,PLTYPE,STAT,TITLE(8),GID(2),TID(2),CN,TN,CM,T  P3D   880
     $ M,SELO(100,2),IXAXIS(7),IYAXIS(7),IZAXIS(7),OPTION(10),PROM,TOTAL,  P3D   890
     $ DI(16),A(100),TVID(100,2),XNAME(2),YNAME(2),ZNAME(2),OBSID(2),BLK,  P3D   900
     $ FMT(20),ICK(7),AXIS(24),DATE(3),NAMES(6),FMTS(20,4)              P3D   910
      REAL X(200),Y(200),Z(200),U(100),RANGES(6),VALUES(6)              P3D   920
      DATA ICK/2HN   L   T   B   H   G       /,NAMES/24HVAR 1   VAR 2   P3D   930
     $  VAR 3   /                                                       P3D   940
      DATA FMTS/32H LOCATED ON STATPAC FORMAT TAPE ,12*4H    ,28H G-FORM  P3D   950
     $ AT,10 VALUES PER CARD,13*4H    ,28H G-FORMAT, 7 VALUES PER CARD ,13  P3D   960
     $ *4H    ,20*4H    /                                               P3D   970
      COMMON TN,TM,TVID,SYSIN,SYSOUT,PLTYPE,STAT                        P3D   980
      COMMON/PLOT3D/X,Y,Z,IDUM,IXAXIS,JDUM,IYAXIS,KDUM,IZAXIS,DI,VALUES,  P3D   990
     $ OPTION                                                           P3D  1000
      EQUIVALENCE (BLK,ICK(7)),(JPER,IPER),(IDUM,AXIS(1)),(FMT(1),FMTS(6  P3D  1010
     $ 1)),(NPLOT,NPLOTS)                                               P3D  1020
C                                                                       P3D  1030
C     INPUT FORMATS                                                     P3D  1040
C                                                                       P3D  1050
  900 FORMAT(7A4,A2,2A4,I5,I3,10I1,16X,I5/8I3,F5.0,F5.0)                P3D  1060
  910 FORMAT(16I5)                                                      P3D  1070
  920 FORMAT(20A4)                                                      P3D  1080
  930 FORMAT (7A4)                                                      P3D  1090
  940 FORMAT(6G10.6)                                                    P3D  1100
  950 FORMAT(10(A1,G6.4),2A4)                                           P3D  1110
  960 FORMAT(10(A1,G6.4))                                               P3D  1120
  970 FORMAT( 7(G9.6,A1),2A4)                                           P3D  1130
  980 FORMAT( 7(G9.6,A1))                                               P3D  1140
C                                                                       P3D  1150
C     OUTPUT FORMATS                                                    P3D  1160
C                                                                       P3D  1170
 1000 FORMAT(23H1THREE DIMENSIONAL PLOT////27HONOW PROCESSING JOB NUMBER  P3D  1180
     $ ,I5/16HODATE OF RUN IS ,I2,1H/,I2,1H/,I2///)                     P3D  1190
 1010 FORMAT(23H1THREE DIMENSIONAL PLOT,8OX,I2,1H/,I2,1H/,I2//13X,5HTITL  P3D  1200
     $ E,21X,8HINPUT ID,7X,1HN,5X,1HM,4X,19H***** OPTIONS *****/1X,7A4,A2  P3D  1210
     $ ,9X,2A4,3X,I5,3X,I3,3X,10I2//)                                   P3D  1220
 1020 FORMAT(25HOCANNOT FIND DATA MATRIX ,2A4/13H JOB SKIPPED.)         P3D  1230
 1030 FORMAT(29HODIMENSION OF MATRIX ON TAPE(,I3,1H,,I5,26H) NOT THE SAM  P3D  1240
     $ E AS ON CARD(,I3,1H,,I5,2H)./13H JOB SKIPPED.)                   P3D  1250
 1040 FORMAT(14HOX VARIABLE - ,2A4,1H(,I3,1H)/14H Y VARIABLE - ,2A4,1H(,  P3D  1260
     $ I3,1H)/14H Z VARIABLE - ,2A4,1H(,I3,1H)//22HOSELECTED OBSERVATIONS  P3D  1270
     $ /(1X,10(2X,I5,1H-,I5,1X)))                                       P3D  1280
 1050 FORMAT(///15H DATA FORMAT - )                                     P3D  1290
 1060 FORMAT(1H+,14X,20A4/////)                                         P3D  1300
 1070 FORMAT(1HO,29X,11HOBSERVATION,6X,2HID,3(9X,2A4)/)                 P3D  1310
```

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```
 1080   FORMAT(33X,I5,4X,2A4,4X,3(1PE10.3,1X,A1,5X))                          P3D  1320
 1090   FORMAT(30H JOB TERMINATED AT OBSERVATION,I4,32H. WILL CHECK OTHER      P3D  1330
     $ OBSERVATIONS. /)                                                       P3D  1340
 2000   FORMAT(24HONUMBER OF OBSERVATIONS,I6,51H NOT EVENLY DIVISIBLE BY N     P3D  1350
     $ UMBER OF POINTS PER LINE,,I3,1H./13H JOB S<IPPED.)                     P3D  1360
 2010   FORMAT(19H0 X SCALE FACTOR = ,1PE10.3/19H  Y SCALE FACTOR = ,1PE10     P3D  1370
     $ .3/19H  Z SCALE FACTOR = ,1PE10.3)                                     P3D  1380
 2020   FORMAT(30H0TO CORRECT X-AXIS SCALE, ADD ,1PE13.6)                      P3D  1390
 2030   FORMAT(30H0TO CORRECT Y-AXIS SCALE, ADD ,1PE13.6)                      P3D  1400
 2040   FORMAT(30H0TO CORRECT Z-AXIS SCALE, ADD ,1PE13.6)                      P3D  1410
 2050   FORMAT( 5 HOAXIS,7X,7HMINIMUM,7X,7HMAXIMUM,7X,9HDIVISION/5H ----,3     P3D  1420
     $ (7X,7(1H-)),1H-/2X,4HX    ,1P3E14.3/2X,4HY    ,3E14.3/2X,4HZ    ,3E14  P3D  1430
     $ .3)                                                                    P3D  1440
 2060   FORMAT(5HOPLOT,5X,5HTHETA,5X,5H TIME/5H ----,5X,5H-----,5X,5H-----     P3D  1450
     $ )                                                                      P3D  1460
 2070   FORMAT(I4,F11.2,-2PE11.2)                                              P3D  1470
 2080   FORMAT(23H1THREE DIMENSIONAL PLOT///31HOFINISHED PROCESSING JOB NU     P3D  1480
     $ MBER,I5/11HOHAVE MADE ,I3,7H PLOTS./15H ELAPSED TIME -)                P3D  1490
 2090   FORMAT(23H1THREE DIMENSIONAL PLOT///10HOPROCESSED,I6,6H JOBS./ 5HO     P3D  1500
     $ MADE,I6,6H PLOTS/14HODATE OF RUN -,I3,1H/,I2,1H/,I2/1H1)               P3D  1510
C                                                                             P3D  1520
C      TAPE UNITS                                                             P3D  1530
C                                                                             P3D  1540
       SYSIN=5                                                                P3D  1550
       SYSOUT=6                                                               P3D  1560
       PLTTPE=11                                                              P3D  1570
       STAT=10                                                                P3D  1580
       REWIND PLTTPE                                                          P3D  1590
       CALL TPNUMV(PLTTPE)                                                    P3D  1600
       CALL CAMRAV(9)                                                         P3D  1610
       CALL JULDAT(IY,IM,ID)                                                  P3D  1620
       CALL JULDAT(DATE(3),DATE(1),DATE(2))                                   P3D  1630
       CALL SLITE(0)                                                          P3D  1640
       ICOUNT=0                                                               P3D  1650
       JCOUNT=0                                                               P3D  1660
C                                                                             P3D  1670
C      READ THE HEADER AND BASIC PARAMETER CARDS                              P3D  1680
C                                                                             P3D  1690
   10  READ(SYSIN,900,END=710) TITLE,CID,CN,CM,OPTION,PRON,IX,IXMULT,IY,I     P3D  1700
     $ YMULT,IZ,IZMULT,IPER,NPLOT,THETAS,DELTA                                P3D  1710
       JCOUNT=JCOUNT+1                                                        P3D  1720
       CALL TIMEIN                                                            P3D  1730
       WRITE(SYSOUT,1000) JCOUNT,DATE                                         P3D  1740
C                                                                             P3D  1750
C      TURN ON CORRECT CAMERA                                                 P3D  1760
C                                                                             P3D  1770
```

```
      IF (OPTION(8).EQ.1) CALL CAMRAV(35)                                P3D  1780
      IF (OPTION(8).EQ.2) CALL CAMRAV(1)                                 P3D  1790
      IF (OPTION(8).EQ.3) CALL CAMRAV(9)                                 P3D  1800
C                                                                        P3D  1810
C     SET UP OBSERVATION SELECTORS                                       P3D  1820
C                                                                        P3D  1830
      IF(PRON) 20,20,30                                                  P3D  1840
   20 PRON=1                                                             P3D  1850
      SELO(1,1)=1                                                        P3D  1860
      SELO(1,2)=CN                                                       P3D  1870
      GO TO 50                                                           P3D  1880
   30 READ(SYSIN,910) ((SELO(I,J),J=1,2),I=1,PRON)                       P3D  1890
      DO 40 I=1,PRON                                                     P3D  1900
   40 IF(SELO(I,2).EQ.0) SELO(I,2)=SELO(I,1)                             P3D  1910
C                                                                        P3D  1920
C     LOCATE VARIABLE IDENTIFIERS                                        P3D  1930
C                                                                        P3D  1940
   50 DO 60 I=1,2                                                        P3D  1950
      XNAME(I)=NAMES(I)                                                  P3D  1960
      YNAME(I)=NAMES(I+2)                                                P3D  1970
   60 ZNAME(I)=NAMES(I+4)                                                P3D  1980
      IF(OPTION(10).NE.0) READ(SYSIN,920) XNAME,YNAME,ZNAME              P3D  1990
C                                                                        P3D  2000
C     WRITE TITLE PAGE                                                   P3D  2010
C                                                                        P3D  2020
      WRITE(SYSOUT,1010) DATE,TITLE,CID,CN,CM,OPTION                     P3D  2030
C                                                                        P3D  2040
C     READ TITLE OF GRAPH                                                P3D  2050
C                                                                        P3D  2060
      IF(OPTION(1).NE.0) READ(SYSIN,920) DI                              P3D  2070
C                                                                        P3D  2080
C     READ AXIS LABELS                                                   P3D  2090
C                                                                        P3D  2100
      IF(OPTION(2).NE.0) READ(SYSIN,930) IXAXIS,IYAXIS,IZAXIS            P3D  2110
C                                                                        P3D  2120
C     READ THE RANGES                                                    P3D  2130
C                                                                        P3D  2140
      IF(OPTION(5).NE.0) READ(SYSIN,940) RANGES                          P3D  2150
C                                                                        P3D  2160
C     CALCULATE THE MULTIPLICATION FACTORS FOR THE 3 VARIABLES           P3D  2170
C                                                                        P3D  2180
      XMULT = 10.**IXMULT                                                P3D  2190
      YMULT = 10.**IYMULT                                                P3D  2200
      ZMULT = 10.**IZMULT                                                P3D  2210
C                                                                        P3D  2220
C     FIND THE DATA MATRIX LOCATED ON TAPE                               P3D  2230
```

```
C
      LOC = OPTION(4)+1                                                  P3D  2240
      GO TO (70,130,140,120),LOC                                         P3D  2250
   70 CALL SEARCH(CID,STAT,690)                                          P3D  2260
      WRITE(SYSOUT,1020) CID                                             P3D  2270
      GO TO 690                                                          P3D  2280
   80 IF((TN.EQ.CN).AND.(TM.EQ.CM)) GO TO 90                             P3D  2290
      WRITE(SYSOUT,1030) TM,TN,CM,CN                                     P3D  2300
      GO TO 690                                                          P3D  2310
   90 ASSIGN 180 TO LOCATE                                               P3D  2320
      IF(OPTION(10)) 150,100,150                                         P3D  2330
  100 DO 110 I=1,2                                                       P3D  2340
      XNAME(I)=TVID(IX,I)                                                P3D  2350
      YNAME(I)=TVID(IY,I)                                                P3D  2360
  110 ZNAME(I)=TVID(IZ,I)                                                P3D  2370
      GO TO 150                                                          P3D  2380
C                                                                        P3D  2390
C     READ IN THE OBJECT TIME FORMAT                                     P3D  2400
C                                                                        P3D  2410
  120 READ(SYSIN,920) FMT                                                P3D  2420
      OBSID(1)=BLK                                                       P3D  2430
      OBSID(2)=BLK                                                       P3D  2440
      A(IX)=BLK                                                          P3D  2450
      A(IY)=BLK                                                          P3D  2460
      A(IZ)=BLK                                                          P3D  2470
      ASSIGN 210 TO LOCATE                                               P3D  2480
      GO TO 150                                                          P3D  2490
  130 ASSIGN 190 TO LOCATE                                               P3D  2500
      GO TO 150                                                          P3D  2510
  140 ASSIGN 200 TO LOCATE                                               P3D  2520
  150 WRITE(SYSOUT,1040) XNAME,IX,YNAME,IY,ZNAME,IZ,((SELO(I,J),J=1,2),I  P3D  2530
     $ =1,PRON)                                                          P3D  2540
      WRITE(SYSOUT,1050)                                                 P3D  2550
      WRITE(SYSOUT,1060) (FMTS(I,LOC),I=1,20)                            P3D  2560
C                                                                        P3D  2570
C     READ IN THE DATA FROM CARDS OR TAPE                                P3D  2580
C                                                                        P3D  2590
      I=0                                                                P3D  2600
      L=0                                                                P3D  2610
      IK=0                                                               P3D  2620
      LINE = 100                                                         P3D  2630
      DO 160 M=1,5,2                                                     P3D  2640
      VALUES(M)=+1.E49                                                   P3D  2650
  160 VALUES(M+1)=-1.E49                                                 P3D  2660
      DO 360 J=1,PRON                                                    P3D  2670
      N1=SELO(J,1)                                                       P3D  2680
                                                                         P3D  2690
```

```
      N2=SELO(J,2)                                                                  P3D  2700
      DO 360 N=N1,N2                                                                P3D  2710
170   GO TO LOCATE,(180,190,200,210)                                                P3D  2720
180   READ(STAT) I,WT,OBSID,INDET,(U(K),K=1,CM),(A(K),K=1,CM)                       P3D  2730
      GO TO 230                                                                     P3D  2740
190   READ(SYSIN,950) (A(K),U(K),K=1,10),OBSID                                      P3D  2750
      IF(CM.GT.10) READ(SYSIN,950) (A(K),U(K),K=11,CM)                              P3D  2760
      GO TO 220                                                                     P3D  2770
200   READ(SYSIN,970) (U(K),A(K),K=1,7),OBSID                                       P3D  2780
      IF(CM.GT.7)  READ(SYSIN,980) (U(K),A(K),K=8,CM)                               P3D  2790
      GO TO 220                                                                     P3D  2800
210   READ(SYSIN,FMT) (U(K),K=1,CM)                                                 P3D  2810
220   I=I+1                                                                         P3D  2820
230   IF(I-N) 170,240,240                                                           P3D  2830
240   L=L+1                                                                         P3D  2840
      X(L)=U(IX)*XMULT                                                              P3D  2850
      Y(L)=U(IY)*YMULT                                                              P3D  2860
      Z(L)=U(IZ)*ZMULT                                                              P3D  2870
      IF(OPTION(6)) 250,280,250                                                     P3D  2880
250   IF(LINE-58) 270,260,260                                                       P3D  2890
260   WRITE(SYSOUT,1010) DATE,TITLE,CID,CN,CM,OPTION                                P3D  2900
      WRITE(SYSOUT,1070) XNAME,YNAME,ZNAME                                          P3D  2910
      LINE =10                                                                      P3D  2920
270   LINE=LINE+1                                                                   P3D  2930
      WRITE(SYSOUT,1080) I,OBSID,U(IX),A(IX),U(IY),A(IY),U(IZ),A(IZ)                P3D  2940
280   IF (A(IX).EQ.BLK.AND.A(IY).EQ.BLK) GO TO 290                                  P3D  2950
      WRITE(SYSOUT,1090) N                                                          P3D  2960
      LINE=LINE+2                                                                   P3D  2970
      CALL SLITE(1)                                                                 P3D  2980
      GO TO 360                                                                     P3D  2990
290   VALUES(1)=AMIN1(VALUES(1),X(L))                                               P3D  3000
      VALUES(2)=AMAX1(VALUES(2),X(L))                                               P3D  3010
      VALUES(3)=AMIN1(VALUES(3),Y(L))                                               P3D  3020
      VALUES(4)=AMAX1(VALUES(4),Y(L))                                               P3D  3030
      IF(A(IZ).EQ.BLK) GO TO 350                                                    P3D  3040
      DO 300 K=1,6                                                                  P3D  3050
      IF(A(IZ).EQ.ICK(K)) GO TO 310                                                 P3D  3060
300   CONTINUE                                                                      P3D  3070
      K=4                                                                           P3D  3080
310   IF(K-4) 320,330,340                                                           P3D  3090
320   Z(L)=0.                                                                       P3D  3100
      GO TO 350                                                                     P3D  3110
330   Z(L) = -1.E+49                                                                P3D  3120
      IK=1                                                                          P3D  3130
      GO TO 360                                                                     P3D  3140
340   Z(L)=1.E+49                                                                   P3D  3150
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      GO TO 360                                                          P3D  3160
  350 VALUES(5)=AMIN1(VALUES(5),Z(L))                                    P3D  3170
      VALUES(6)=AMAX1(VALUES(6),Z(L))                                    P3D  3180
  360 CONTINUE                                                           P3D  3190
      CALL SLITET(1,I)                                                   P3D  3200
      IF(I.EQ.1) GO TO 690                                               P3D  3210
      IF(MOD(L,JPER)) 370,380,370                                        P3D  3220
  370 WRITE(SYSOUT,2000) L,JPER                                          P3D  3230
      GO TO 690                                                          P3D  3240
  380 J=L/JPER                                                           P3D  3250
C                                                                        P3D  3260
C     REARRANGE THE DATA IF DESIRED                                      P3D  3270
C                                                                        P3D  3280
      IF(OPTION(3)-1) 410,390,400                                        P3D  3290
  390 CALL ARRANG(JPER,J,L,X,Y,Z)                                        P3D  3300
      GO TO 410                                                          P3D  3310
  400 CALL ARRANG(JPER,J,L,Y,X,Z)                                        P3D  3320
C                                                                        P3D  3330
C     IF NEEDED, CALCULATE Z VALUES FOR INDETERMINANTS                   P3D  3340
C                                                                        P3D  3350
  410 IF(IK) 420,550,420                                                 P3D  3360
  420 I2=0                                                               P3D  3370
      DO 540 K=1,J                                                       P3D  3380
      I1=I2+1                                                            P3D  3390
      I2=I2+JPER                                                         P3D  3400
      DO 530 M=I1,I2                                                     P3D  3410
      IF(Z(M).NE.-1.E+49) GO TO 530                                      P3D  3420
      IF(M.NE.I1) GO TO 450                                              P3D  3430
      I3=I1+1                                                            P3D  3440
      DO 430 N=I3,I2                                                     P3D  3450
      IF(Z(N).NE.-1.E49) GO TO 450                                       P3D  3460
  430 CONTINUE                                                           P3D  3470
      DO 440 N=I1,I2                                                     P3D  3480
  440 Z(N)=0.                                                            P3D  3490
      GO TO 540                                                          P3D  3500
  450 Z(M)=Z(N)                                                          P3D  3510
      GO TO 530                                                          P3D  3520
  460 IF(M.NE.I2) GO TO 470                                              P3D  3530
      Z(M)=Z(M-1)                                                        P3D  3540
      GO TO 530                                                          P3D  3550
  470 I3=M+1                                                             P3D  3560
      DO 480 N=I3,I2                                                     P3D  3570
      IF(Z(N).NE.-1.E49) GO TO 490                                       P3D  3580
  480 CONTINUE                                                           P3D  3590
      Z(M)=Z(M-1)                                                        P3D  3600
      GO TO 530                                                          P3D  3610
```

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  490   IF(OPTION(3).EQ.2) GO TO 510                                          P3D  3620
        IF(X(N).EQ.X(M-1)) GO TO 500                                          P3D  3630
        Z(M) = (ABS(X(M)-X(N))*Z(M-1) + ABS(X(M)-X(M-1))*Z(N)) / ABS(X(N)-    P3D  3640
     $ X(M-1))                                                                P3D  3650
        GO TO 530                                                             P3D  3660
  500   Z(M) = (Z(N)+Z(M-1))/2.                                               P3D  3670
        GO TO 530                                                             P3D  3680
  510   IF(Y(N).EQ.Y(M-1)) GO TO 520                                          P3D  3690
        Z(M) = (ABS(Y(M)-Y(N))*Z(M-1) + ABS(Y(M)-Y(M-1))*Z(N)) / ABS(Y(N)-    P3D  3700
     $ Y(M-1))                                                                P3D  3710
        GO TO 530                                                             P3D  3720
  520   Z(M) = (Z(N)+Z(M-1))/2.                                               P3D  3730
  530   CONTINUE                                                              P3D  3740
  540   CONTINUE                                                              P3D  3750
  550   WRITE(SYSOUT,1010) DATE,TITLE,CID,CN,CM,OPTION                        P3D  3760
        WRITE(SYSOUT,2010) XMULT,YMULT,ZMULT                                  P3D  3770
C                                                                             P3D  3780
C       USE THE RANGES GIVEN BY THE PROGRAMMER                                P3D  3790
C                                                                             P3D  3800
        IF(OPTION(5).EQ.0) GO TO 570                                          P3D  3810
        DO 560 I=1,5,2                                                        P3D  3820
        VALUES(I)=AMIN1(RANGES(I),VALUES(I))                                  P3D  3830
  560   VALUES(I+1)=AMAX1(RANGES(I+1),VALUES(I+1))                            P3D  3840
C                                                                             P3D  3850
C       TRANSLATE THE COORDINATE AXES IF NECESSARY                            P3D  3860
C                                                                             P3D  3870
  570   IF(VALUES(1))580,600,600                                              P3D  3880
  580   WRITE(SYSOUT,2020) VALUES(1)                                          P3D  3890
        DO 590 I=1,L                                                          P3D  3900
  590   X(I)=X(I)-VALUES(1)                                                   P3D  3910
        VALUES(2)=VALUES(2)-VALUES(1)                                         P3D  3920
        VALUES(1)=0.                                                          P3D  3930
  600   IF(VALUES(3))610,630,630                                              P3D  3940
  610   WRITE(SYSOUT,2030) VALUES(3)                                          P3D  3950
        DO 620 I=1,L                                                          P3D  3960
  620   Y(I)=Y(I)-VALUES(3)                                                   P3D  3970
        VALUES(4)=VALUES(4)-VALUES(3)                                         P3D  3980
        VALUES(3)=0.                                                          P3D  3990
  630   IF(VALUES(5)) 640,660,660                                             P3D  4000
  640   WRITE(SYSOUT,2040) VALUES(5)                                          P3D  4010
        DO 650 I=1,L                                                          P3D  4020
  650   Z(I) = Z(I)-VALUES(5)                                                 P3D  4030
        VALUES(6)=VALUES(5)-VALUES(5)                                         P3D  4040
        VALUES(5)=0.                                                          P3D  4050
  660   DO 670 I=1,5,2                                                        P3D  4060
  670   RANGES(I)=(VALUES(I+1)-VALUES(I))/10.                                 P3D  4070
```

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      WRITE(SYSOUT,2050) (VALUES(I),VALUES(I+1),RANGES(I),I=1,5,2)      P3D  4080
      WRITE(SYSOUT,1010) DATE,TITLE,CID,CN,CM,OPTION                    P3D  4090
      WRITE(SYSOUT,2060)                                                P3D  4100
C                                                                       P3D  4110
C     MAKE THE GRAPH                                                    P3D  4120
C                                                                       P3D  4130
      DO 680 I=1,NPLOTS                                                 P3D  4140
      CALL TIMDAT(JTIME,JDATA)                                          P3D  4150
      CALL PLOT03(L,JPEP,THETAS,7.4,7.4,7.4)                            P3D  4160
      CALL TIMDAT(JTIME1,JDATA)                                         P3D  4170
      TIMES = JTIME1-JTIME                                              P3D  4180
      WRITE(SYSOUT,2070) I,THETAS,TIMES                                 P3D  4190
C                                                                       P3D  4200
C     INCREMENT THETA BY DELTA AND INCREMENT COUNTER BY 1               P3D  4210
C                                                                       P3D  4220
      THETAS=THETAS+DELTA                                               P3D  4230
      ICOUNT=ICOUNT+1                                                   P3D  4240
  680 CONTINUE                                                          P3D  4250
      GO TO 700                                                         P3D  4260
C                                                                       P3D  4270
C     CONTROL PASSED HERE IF ERROR DETECTED                             P3D  4280
C                                                                       P3D  4290
  690 NPLOT=0                                                           P3D  4300
  700 WRITE(SYSOUT,2080) JCOUNT,NPLOTS                                  P3D  4310
      CALL TIMED(I)                                                     P3D  4320
      GO TO 10                                                          P3D  4330
C                                                                       P3D  4340
C     CONTROL PASSED HERE IF END-OF-FILE DETECTED ON SYSIN              P3D  4350
C                                                                       P3D  4360
  710 CALL PLOTND(I)                                                    P3D  4370
      REWIND PLTTPE                                                     P3D  4380
      REWIND STAT                                                       P3D  4390
      WRITE(SYSOUT,2090) JCOUNT,ICOUNT,DATE                             P3D  4400
      STOP                                                              P3D  4410
      DEBUG UNIT(6),TRACE                                               P3D  4420
      END                                                               P3D  4430
      SUBROUTINE SEARCH(NAME,UNIT,*)                                    P3D  4440
C                                                                       P3D  4450
C     THIS SUBROUTINE IS USED TO FIND A PARTICULAR MATRIX WHICH         P3D  4460
C     IS LOCATED ON THE STATPAC TAPE                                    P3D  4470
C     THE MATRIX NAME IS 'NAME'; IT IS FOUND ON UNIT 'UNIT'.            P3D  4480
C     IF THE MATRIX IS FOUND, RETURN IS MADE BY ALTERNATE               P3D  4490
C     RETURN 1.                                                         P3D  4500
C     IF THE MATRIX IS NOT FOUND, RETURN IS MADE BY THE                 P3D  4510
C     NORMAL RETURN.                                                    P3D  4520
C     THIS SUBROUTINE IS ALSO USED TO READ IN THE VARIABLE IDENTIFIERS  P3D  4530
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C
      INTEGER NAME(2),UNIT,ID(2),TVID(100,2),TN,TM                          P3D  4540
      COMMON TN,TM,TVID                                                     P3D  4550
      REWIND UNIT                                                           P3D  4560
   10 READ(UNIT,END=30) ID,TN,TM,((TVID(I,J),J=1,2),I=1,TM  )               P3D  4570
      IF((ID(1).EQ.NAME(1)).AND.(ID(2).EQ.NAME(2))) RETURN 1                P3D  4580
      DO 20 I=1,TN                                                          P3D  4590
   20 READ(UNIT,END=30)                                                     P3D  4600
      GO TO 10                                                              P3D  4610
   30 RETURN                                                                P3D  4620
      DEBUG UNIT(6),TRACE                                                   P3D  4630
      END                                                                   P3D  4640
      SUBROUTINE ARRANG(JPER,JLINE,L,X,Y,Z)                                 P3D  4650
C                                                                           P3D  4660
C     THIS SUBROUTINE IS USED TO REARRANGE THE POINTS IN                    P3D  4670
C     DECREASING ORDER OF X AND Y.  FIRST THE ORDERING IS                   P3D  4680
C     DONE ON Y.  THEN FOR EACH GROUP OF JPER POINTS, THE VALUES            P3D  4690
C     ARE REARRANGED ON X.                                                  P3D  4700
C                                                                           P3D  4710
      DIMENSION X(1),Y(1),Z(1)                                              P3D  4720
C                                                                           P3D  4730
C     REARRANGE ON Y                                                        P3D  4740
C                                                                           P3D  4750
      LM1=L-1                                                               P3D  4760
      DO 10 I=1,LM1                                                         P3D  4770
      IP1=I+1                                                               P3D  4780
      DO 10 J=IP1,L                                                         P3D  4790
      IF(Y(I).LE.Y(J)) GO TO 10                                             P3D  4800
      CALL SWITCH(X(I),X(J),Y(I),Y(J),Z(I),Z(J))                            P3D  4810
   10 CONTINUE                                                              P3D  4820
C                                                                           P3D  4830
C     REARRANGE ON X                                                        P3D  4940
C                                                                           P3D  4850
      I=0                                                                   P3D  4860
      DO 20 K=1,JLINE                                                       P3D  4870
      I1=I+1                                                                P3D  4880
      I=I+JPER                                                              P3D  4890
      I3=I-1                                                                P3D  4900
      DO 20 M=I1,I3                                                         P3D  4910
      MP1=M+1                                                               P3D  4920
      DO 20 N=MP1,I                                                         P3D  4930
      IF(X(M).LE.X(N)) GO TO 20                                             P3D  4940
      CALL SWITCH(X(M),X(N),Y(M),Y(N),Z(M),Z(N))                            P3D  4950
   20 CONTINUE                                                              P3D  4960
      RETURN                                                                P3D  4970
      DEBUG UNIT(6),TRACE                                                   P3D  4980
                                                                            P3D  4990
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      END                                                                P3D  5000
      SUBROUTINE SWITCH(A,B,C,D,E,F)                                     P3D  5010
C                                                                        P3D  5020
C     THIS SUBROUTINE IS USED BY THE SUBROUTINE ARRANG.                  P3D  5030
C     IT INTERCHANGES VALUES OF THE X,Y, AND Z COORDINATES               P3D  5040
C     OF TWO POINTS.                                                     P3D  5050
      T=A                                                                P3D  5060
      A=B                                                                P3D  5070
      B=T                                                                P3D  5080
      T=C                                                                P3D  5090
      C=D                                                                P3D  5100
      D=T                                                                P3D  5110
      T=E                                                                P3D  5120
      E=F                                                                P3D  5130
      F=T                                                                P3D  5140
      RETURN                                                             P3D  5150
      DEBUG UNIT(6),TRACE                                                P3D  5160
      END                                                                P3D  5170
      SUBROUTINE PLOT3D(NUM,J,DEG,IA,IC,ID,IE,IG,IJ)                     P3D  5180
C                                                                        P3D  5190
C     THIS SUBROUTINE DOES THE ACTUAL PLOTTING                           P3D  5200
C     WRITTEN BY RONALD W. DURACHKA                                      P3D  5210
C     GODDARD SPACE FLIGHT CENTER                                        P3D  5220
C     GREENBELT, MARYLAND                                                P3D  5230
C     MODIFIED BY PAUL R. DORN                                           P3D  5240
C     CHESAPEAKE TECHNICAL SUPPORT LABORATORY                            P3D  5250
C                                                                        P3D  5260
      REAL X(200),Y(200),Z(200),VALUES(6),XAXIS(6),YAXIS(6),ZAXIS(6)     P3D  5270
      INTEGER XTRAN,YTRAN,XTRANI,YTRANI,XX,YY,ZZ,OPTION(10),DI(16),IXAXI  P3D  5280
     1 S(8),IYAXIS(8),IZAXIS(8)                                          P3D  5290
      COMMON/PLOT3D/X,Y,Z,IXAXIS,IYAXIS,IZAXIS,DI,XLOW,HIGHX,YLOW,HIGHY,  P3D  5300
     $ ZLOW,HIGHZ,OPTION                                                 P3D  5310
      EQUIVALENCE(XLOW,VALUES(1))                                        P3D  5320
      DATA XX,YY,ZZ,IX1,IX2,IX3/1HX,1HY,1HZ,4HX = ,4HY = ,4HZ = /         P3D  5330
      DATA ICOUNT/0/                                                     P3D  5340
      IF(ICOUNT.NE.0) GO TO 12                                           P3D  5350
      ICOUNT = 1                                                         P3D  5360
      IXAXIS(1) = IX1                                                    P3D  5370
      IYAXIS(1) = IX2                                                    P3D  5380
      IZAXIS(1) = IX3                                                    P3D  5390
C                                                                        P3D  5400
C     ADVANCE FRAME                                                      P3D  5410
C                                                                        P3D  5420
   12 CALL FRAMEV(2)                                                     P3D  5430
      JI = J                                                             P3D  5440
      XL=XLOW                                                            P3D  5450
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      XH=HIGHX                                                          P3D  5460
      YL=YLOW                                                           P3D  5470
      YH=HIGHY                                                          P3D  5480
      ZL=ZLOW                                                           P3D  5490
      ZH=HIGHZ                                                          P3D  5500
      LY2=510+5*DEG                                                     P3D  5510
      LX1=60                                                            P3D  5520
      LY1=60+DEG*5                                                      P3D  5530
      XTRAN = INT(510 - (5. * DEG))                                     P3D  5540
      XTRAN1 = INT(510 + (2.34 * DEG))                                  P3D  5550
       YTRAN=60                                                         P3D  5560
       YTRAN1=510                                                       P3D  5570
C                                                                       P3D  5580
C     DRAW THE THREE AXES                                               P3D  5590
C                                                                       P3D  5600
      DO 1 I=1,4                                                        P3D  5610
      CALL LINEV(60,LY1,60,LY2)                                         P3D  5620
      CALL LINEV(60,LY1,XTRAN,YTRAN)                                    P3D  5630
    1 CALL LINEV(60,LY1,XTRAN1,YTRAN1)                                  P3D  5640
C                                                                       P3D  5650
C     LABEL THE THREE AXES                                              P3D  5660
C                                                                       P3D  5670
      IX=XTRAN+10                                                       P3D  5680
      IY=YTRAN-5                                                        P3D  5690
      CALL APRNTV(0,0,-1,XX ,IX,IY)                                     P3D  5700
      IX=XTRAN1+10                                                      P3D  5710
      IY=YTRAN1+10                                                      P3D  5720
      CALL APRNTV(0,0,-1,YY ,IX,IY)                                     P3D  5730
      IY=LY2+10                                                         P3D  5740
      CALL APRNTV(0,0,-1,ZZ ,60,IY)                                     P3D  5750
C                                                                       P3D  5760
C     CALCULATE THE SCALES FOR THE THREE AXES                           P3D  5770
C                                                                       P3D  5780
      A=XL                                                              P3D  5790
       B=(HIGHX-A)/5                                                    P3D  5800
      XAXIS(1)=XL                                                       P3D  5810
      XAXIS(2)=XAXIS(1)+B                                               P3D  5820
      XAXIS(3)=XAXIS(2)+B                                               P3D  5830
      XAXIS(4)=XAXIS(3)+B                                               P3D  5840
      XAXIS(5)=XAXIS(4)+B                                               P3D  5850
      XAXIS(6)=HIGHX                                                    P3D  5860
      A=YL                                                              P3D  5870
       B=(HIGHY-A)/5                                                    P3D  5880
      YAXIS(1)=YL                                                       P3D  5890
      YAXIS(2)=YAXIS(1)+B                                               P3D  5900
      YAXIS(3)=YAXIS(2)+B                                               P3D  5910
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      YAXIS(4)=YAXIS(3)+B                                              P3D  5920
      YAXIS(5)=YAXIS(4)+B                                              P3D  5930
      YAXIS(6)=HIGHY                                                   P3D  5940
      A=ZL                                                             P3D  5950
       B=(HIGHZ-A)/5                                                   P3D  5960
      ZAXIS(1)=ZL                                                      P3D  5970
      ZAXIS(2)=ZAXIS(1)+B                                              P3D  5980
      ZAXIS(3)=ZAXIS(2)+B                                              P3D  5990
      ZAXIS(4)=ZAXIS(3)+B                                              P3D  6000
      ZAXIS(5)=ZAXIS(4)+B                                              P3D  6010
      ZAXIS(6)=HIGHZ                                                   P3D  6020
      IK=IA/2                                                          P3D  6030
      MX=60-(IK*12)                                                    P3D  6040
      MY=LY1-10                                                        P3D  6050
      MY1=(LY1-60)/5                                                   P3D  6060
      MX1=(XTRAN-60)/5                                                 P3D  6070
C                                                                      P3D  6080
C     PRINT THE AXES SCALES                                            P3D  6090
C                                                                      P3D  6100
      IF(OPTION(7).NE.0) GO TO 19                                      P3D  6110
      DO 2 I=1,6                                                       P3D  6120
      CALL LABLV(XAXIS(I),MX,MY,IA,2,IC)                               P3D  6130
      MX=MX+MX1                                                        P3D  6140
    2 MY=MY-MY1                                                        P3D  6150
      MY=LY1                                                           P3D  6160
      MX=0                                                             P3D  6170
      DO 3 I=1,6                                                       P3D  6180
      CALL LABLV(ZAXIS(I),MX,MY,IG,2,IJ)                               P3D  6190
    3 MY=MY+90                                                         P3D  6200
      MY=LY1                                                           P3D  6210
      MX=45                                                            P3D  6220
      MX1=(XTRAN1-60)/5                                                P3D  6230
      MY1=(YTRAN1-LY1)/5                                               P3D  6240
      DO 4 I=1,6                                                       P3D  6250
      CALL LABLV(YAXIS(I),MX,MY,ID,2,IF)                               P3D  6260
      MY=MY+MY1                                                        P3D  6270
    4 MX=MX+MX1                                                        P3D  6280
   19 CONTINUE                                                         P3D  6290
C                                                                      P3D  6300
C     DRAW THE GRAPH'S DIVISIONS                                       P3D  6310
C                                                                      P3D  6320
      IX1=LX1                                                          P3D  6330
      IY1=LY1                                                          P3D  6340
      IX2=XTRAN                                                        P3D  6350
      IY2=YTRAN                                                        P3D  6360
      INCY=(YTRAN1-LY1)/10                                             P3D  6370
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      INCX=(XTRAN1-60)/10                                                P3D  6380
      IX3=LX1                                                            P3D  6390
      IY3=LY2                                                            P3D  6400
      DO 5 I=1,9                                                         P3D  6410
      IX1=IX1+INCX                                                       P3D  6420
      IY1=IY1+INCY                                                       P3D  6430
      IX2=IX2+INCX                                                       P3D  6440
      IY2=IY2+INCY                                                       P3D  6450
      IX3=IX3+INCX                                                       P3D  6460
      IY3=IY3+INCY                                                       P3D  6470
      CALL LINEV (IX1,IY1,IX2,IY2)                                       P3D  6480
    5 CALL LINEV (IX1,IY1,IX3,IY3)                                       P3D  6490
      IY1=YTRAN1+450                                                     P3D  6500
      CALL LINEV (XTRAN1,YTRAN1,XTRAN1,IY1)                              P3D  6510
      IX3=XTRAN+XTRAN1-60                                                P3D  6520
      IY3=YTRAN+YTRAN1-LY1                                               P3D  6530
      CALL LINEV (XTRAN1,YTRAN1,IX3,IY3)                                 P3D  6540
      IX1=LX1                                                            P3D  6550
      IY1=LY1                                                            P3D  6560
      IX2=XTRAN1                                                         P3D  6570
      IY2=YTRAN1                                                         P3D  6580
      DO 6 I=1,10                                                        P3D  6590
      IY1=IY1+45                                                         P3D  6600
      IY2=IY2+45                                                         P3D  6610
    6 CALL LINEV (IX1,IY1,IX2,IY2)                                       P3D  6620
      IY1=LY1                                                            P3D  6630
      IY2=YTRAN1                                                         P3D  6640
      INCX=(XTRAN-60)/10                                                 P3D  6650
      INCY=(LY1-60)/10                                                   P3D  6660
      DO 7 I=1,9                                                         P3D  6670
      IX1=IX1+INCX                                                       P3D  6680
      IY1=IY1-INCY                                                       P3D  6690
      IX2=IX2+INCX                                                       P3D  6700
      IY2=IY2-INCY                                                       P3D  6710
    7 CALL LINEV(IX1,IY1,IX2,IY2)                                        P3D  6720
      CALL LINEV (XTRAN,YTRAN,IX3,IY3)                                   P3D  6730
C                                                                        P3D  6740
C     PRINT THE AXES' LABELS IN THE UPPER RIGHT-HAND CORNER              P3D  6750
C                                                                        P3D  6760
      IF(IOPTION(2).EQ.0) GO TO 8                                        P3D  6770
      CALL PRINTV(32,IXAXIS,750,925)                                     P3D  6780
      CALL PRINTV(32,IXAXIS,750,925)                                     P3D  6790
      CALL PRINTV(32,IYAXIS,750,909)                                     P3D  6800
      CALL PRINTV(32,IYAXIS,750,909)                                     P3D  6810
      CALL PRINTV(32,IZAXIS,750,893)                                     P3D  6820
      CALL PRINTV(32,IZAXIS,750,893).                                    P3D  6830
```

```
C
C     PRINT THE TITLE AT THE BOTTOM OF THE PAGE                          P3D  6840
C                                                                        P3D  6850
    8 IF(OPTION(1).EQ.0) GO TO 9                                         P3D  6860
      CALL RITE2V(7,20,1023,20,2,64,1,01,181)                            P3D  6870
      GO TO 9                                                            P3D  6880
C                                                                        P3D  6890
C     ENTRY TO ADD ANOTHER PLOT TO THE SAME GRAPH                        P3D  6900
C                                                                        P3D  6910
      ENTRY PT3DAD(NUM)                                                  P3D  6920
      J = NUM                                                            P3D  6930
      J1 = J                                                             P3D  6940
    9 IYM=SQRT(FLOAT((XTRAN1-60)**2+(YTRAN1-LY1)**2))                    P3D  6950
      N1=J                                                               P3D  6960
      K=0                                                                P3D  6970
      NX1=5000                                                           P3D  6980
      NZ1=5000                                                           P3D  6990
C                                                                        P3D  7000
C     CONVERT THE THREE DIMENSIONAL POINT TO ITS EQUIVALENT              P3D  7010
C     IN TWO DIMENSIONAL SPACE                                           P3D  7020
      DO 10 I=1,NUM                                                      P3D  7030
   11 NX=((XTRAN-60)/(XH-XL)*(X(I)-XL))+60                               P3D  7040
   22 NY=IYM/(YH-YL)*(Y(I)-YL)                                           P3D  7050
   13 NZ=450./(ZH-ZL)*Z(I)-ZL)+60.                                       P3D  7060
   14 NZ=NZ+(((LY1-60)*(XTRAN-NX))/(XTRAN-60))                           P3D  7070
   15 NX=NX+((NY*(XTRAN1-60))/IYM)                                       P3D  7080
   16 NZ=NZ+((NY*(YTRAN1-LY1))/IYM)                                      P3D  7090
      K=K+1                                                              P3D  7100
      IF((NX.GT.1023).OR.(NZ.GT.1023))GO TO 10                           P3D  7110
      IF (NX .LT.. 0 .OR. NZ .LT. 0) GO TO 10                            P3D  7120
   17 CALL PLOTV (NX,NZ,44)                                              P3D  7130
      IF((NX.GT.1023).OR.(NZ.GT.1023))GO TO 10                           P3D  7140
      IF((NX1.GT.1023).OR.(NZ1.GT.1023))GO TO 10                         P3D  7150
      IF (NX .LT.. 0 .OR. NZ .LT. 0) GO TO 10                            P3D  7160
      IF (NX1.LT.. 0 .OR. NZ1.LT. 0) GO TO 10                            P3D  7170
      CALL LINEV (NX,NZ,NX1,NZ1)                                         P3D  7180
   10 NX1=NX                                                             P3D  7190
      NZ1=NZ                                                             P3D  7200
      IF(K.NE.N1)GO TO18                                                 P3D  7210
      NX1=5000                                                           P3D  7220
      NZ1=5000                                                           P3D  7230
      N1=N1+J                                                            P3D  7240
   18 CONTINUE                                                           P3D  7250
      J=J1                                                               P3D  7260
      RETURN                                                             P3D  7270
      DEBUG UNIT(6),TRACE                                                P3D  7280
                                                                         P3D  7290
```

```
      END                                                                P3D  7300
      SUBROUTINE TIMDAY(I,J)                                             P3D  7310
C                                                                        P3D  7320
C     THIS SUBROUTINE SHOULD RETURN THE TIME OF DAY AS FOLLOWS:          P3D  7330
C        I = TIME OF DAY IN HUNDREDTHS OF SECONDS                        P3D  7340
C        J = THE JULIAN DATE                                             P3D  7350
C     THIS SUBROUTINE SHOULD BE ON THE SYSTEM LIBRARY                    P3D  7360
C                                                                        P3D  7370
      I=0                                                                P3D  7380
      J=0                                                                P3D  7390
      RETURN                                                             P3D  7400
      END                                                                P3D  7410
```

***** END OF PROGRAM *****

COMPUTER CENTER DIVISION
REQUEST FOR USE OF
4020 PLOTTER

Job Number

Start Time _____ Stop Time _____
TOTAL Time _____
No. of Frames _____

Div Cols. 4-5 Acct# Cols. 22-5
Prog# Cols. 17-20 User Code Box Number
Date _____ Est. Time _____

Name of contact PROGRAMMER Phone XXX-XXXX

Input tape numbers PLOTTER TAPE # Density 556

Mode of operation:	Plot ✓	Print Normal _____	Print List _____
Output Type:	Film (35 mm)	Hard copy 9 inch	Both _____
Image size:	Normal ✓	Expanded _____	
Tube position:	Normal ✓	90° Shifted _____	

Est. number of frames 5 Est. number of files 1
Number of copies 1 each

SPECIAL INSTRUCTIONS

OPERATOR COMMENTS

SAMPLE FORM USGS